DOCUMENT RESUME

ED 089 464 EA 006 051

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TITLE Minnesota Educational Assessment: Pilot Phase Results. Summary Report.
INSTITUTION Minnesota State Dept. of Education, St. Paul. Div. of Planning and Development.
PUB DATE Feb 73
NOTE 20p.; A related document is EA 005 636

EDRS PRICE MF-$0.75 HC-$1.50 PLUS POSTAGE
DESCRIPTORS Academic Achievement; *Attitudes; *Educational Accountability; *Educational Assessment; Elementary Education; *Mathematics; Program Effectiveness; *Reading Ability; State Programs; State Surveys
IDENTIFIERS Minnesota; NAEP; National Assessment of Education Progress

ABSTRACT

The main document, of which this report is a summary, covers the assessment activities of the Minnesota Department of Education from June 1971 through December 1972. This summary report contains a chapter-by-chapter overview of the full report, with a concentration on the conclusions and recommendations drawn from the reading, mathematics, and attitude findings of the study. (JF)

ED 089464

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# MINNESOTA EDUCATIONAL ASSESSMENT PILOT PHASE RESULTS

## SUMMARY REPORT

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February, 1973

EA 006 051

# SUMMARY REPORT

The Minnesota Educational Assessment: Pilot Phase Results Report covers the assessment activities of the Minnesota Department of Education from June 1971 through December 1972. This summary report contains a chapter by chapter overview of the full report, with a concentration on the conclusions and recommendations.

## CHAPTER I. AN INTRODUCTION

The Governor's Advisory Committee on Education for the Seventies recommended in its Report and Recommendations that "an educational assessment program for Minnesota should be initiated." At all levels of education the citizens' demand for "accountability" has been heard and many efforts to meet that demand have been undertaken.

Commissioner Howard B. Casmey has concluded that these needs are of paramount importance and has designated the development of a statewide assessment program as the top priority state department planning activity. The results of this assessment effort are expected to be presented to the 1973 Legislature as the primary basis for support of an on-going state program.

During fiscal year 1971, the Division of Planning and Development began planning the educational assessment program within the Department of Education, and solicited viewpoints and participation from a number of educational organizations in shaping the plan of attack. As a result of these discussions, the following specific objectives were assigned to the assessment program:

(1) To determine the level of performance of students in this state in the cognitive, affective and psychomotor domains.

(2) To identify the variables which account for the variations in student performance.

(3) To report the results of this investigation to educational decision-makers in the Executive and Legislative branches of state government, the State Board of Education, the Department of Education, local school administrators, local school boards and interested citizens of the state providing a guide for the allocation of school resources.

(4) To longitudinally report the extent to which progress is being made in Minnesota schools toward improving student performance within the State of Minnesota.

The first year of the program was concerned primarily with the first objective and secondarily with the third. It was assumed that until representative educational objectives and valid measurement techniques could be established, it would be neither feasible nor appropriate to pursue the second objective. It was further assumed that the results of the pilot year should not be considered complete enough to serve as a guide for resource allocation. Objective number four, of course, will be addressed over a period of time.

## CHAPTER II. THE PLANNING PROCESS

A two-phased approach to the planning process is described. The Determination Phase included a review of assessment activities in other states, an exploration of existing data sources, the formation of advisory groups, and presentations of Departmental plans to interested groups.

The Pilot Phase focused on the development of an objectives based model for assessing achievement in reading and mathematics at the end of grades three and six. A procedure for identifying attitudinal measures followed a plan similar to that used for reading and mathematics. The Pilot Phase model outlined the following steps:

(1) Identification of relevant instructional objectives in the areas of reading and mathematics at the end of Grades three and six, determined by key math and reading educators of the State.

(2) Acceptance as relevant instructional objectives by school personnel in the State.

(3) Acceptance as desirable objectives by citizens of the State concerned with education.

(4) Development of specifications for instrumentation which would measure if and/or to what extent these objectives are being achieved.

(5) Identification of educational needs, defined as the discrepancy between desired and actual performance.

The Development of the Sampling Plan was guided by recommendations from the Assessment Advisory Council. A five percent random sample of third and sixth grade classrooms of the state was the plan recommended by the Council and implemented by the Department.

The Assignment of Tests to the students selected in the sample was based on a matrix sampling plan which resulted in any one student receiving only a fraction of the total number of test items. A calendar of events is included in this chapter.

## CHAPTER III. DEVELOPMENT OF OBJECTIVES AND INSTRUMENTS

This chapter provides a detailed description of the developmental steps leading to the construction of reading, mathematics, and affective instruments.

The Minnesota Reading Assessment Instrument was based upon the fundamental objectives for reading instruction set out by the Statewide Committee for Reading Assessment. These objectives represented an independent, logical analysis of reading as a developmental process. Four general testing domains arose from the accepted objectives: 1) Word Attack, 2) Word and Sentence Comprehension, 3) Comprehension in Longer Discourse, and 4) Reading Study Skills. Within each testing domain a set of subtests was created to measure reading skills designated as critical to a child's progress in any well conceived elementary school reading program.

The task of developing an instrument for assessing the mathematical competencies of third and sixth grade students in Minnesota included the development of objectives and the writing of test items.

Objectives were written for both grade levels and included the areas of Numeration, Addition and Subtraction, Multiplication and Division, Graphs and Patterns, Geometry, Measurement, Relations and Functions, Probability,

Sets and Logic, and Problem Solving. The topic of Fractions was applicable only for the sixth grade.

Due to time constraints placed on item writing it was necessary to limit the number of areas for testing. Numeration, Operations (whole numbers, fractions, and decimals): Addition, Subtraction, Multiplication, and Division, and Geometry were selected as the areas to be covered. The judgment to cover these topics was based upon their somewhat representative nature. Operations covered the mainstream of computational skills, while some concept development was picked up in Numeration and Geometry.

It was originally thought that the Minnesota Attitudinal Survey could be drawn primarily from existing affective instruments. However, review of the attitudinal tests used in other states revealed that none of them were totally appropriate for the general areas of interest in Minnesota and also that the validity and reliability of such measures were not much greater than that which could be achieved in Minnesota after a year of pilot testing. Therefore, development of a Minnesota Attitude Inventory began at an earlier time than the development of any of the other objective referenced tests finally used in the pilot assessment.

The limited outline which served as the basis for the generation of the assessment instrument focused on the following eight areas:

(1) Attitudes Toward School and School/Achievement

(2) School Atmosphere

(3) Self Concept

(4) Attitudes Toward Reading

(5) Attitudes Toward Mathematics

(6) Citizenship

(7) Attitudes Toward Careers and the World of Work

(8) Attitudes Toward the Environment and Ecology

## CHAPTER IV. IMPLEMENTATION AND ANALYSIS

This chapter outlines the procedures used in the administration, data handling, analysis, and reporting of the results of the pilot phase assessment.

As a necessary step in the preparation of teachers to administer the assessment instrument, four regional in-service meetings for the classroom teachers selected in the sample were held in Minneapolis, St. Paul, Mankato, and Brainerd. At the meetings, the student packages were distributed to the teachers and administration procedures were reviewed with them.

In order to minimize the fatigue factor for students, the teachers administered the three packages as follows:

(1) The first package at the beginning of school.

(2) The second package at mid-morning.

(3) The third package in the afternoon.

The statistical analysis phase provided data for interpretation from the mathematics, reading and attitudinal tests. The area of mathematics provided data by item within form, within grade, as well as across the forms

for common items within a grade. For reading, it provided data by item within form, within grades, as well as by item, across forms within grades for those common items. In the attitudinal survey, the analysis provided the percentage distribution of the responses for each item by form within grade.

## CHAPTER V. RESULTS

The complete results in mathematics and for the attitudinal survey are given in this chapter together with the objectives which were being measured. For the reading results, only sample items are given for each of the subtests.

Only about one-half of the mathematics objectives were tested. The reading subtests covered all but the "higher mental processes", an area which was suggested in the reading objectives, but which was found too difficult to measure within the time given for instrument development. The reading subtests include word attack skills, word and sentence comprehension, and reading study skills.

The attitudinal survey is limited to school and school related variables. Several other attitudes might have been measured, but for reasons of being outside of normal school influences or of having little informational value, other attitude scales were not included.

Teacher reactions are summarized in this chapter. Each of the third and sixth grade teachers were asked to complete an evaluation of the reading, mathematics, and attitudinal instruments. These evaluations were included in the package of completed tests which were returned during the week of May 15, 1972.

A five point rating scale was used for the responses to five questions which covered the clarity of the directions, the appropriateness of content and language, and the adequacy of time alloted.

The ratings were averaged across all of the respondents. The ratings were all above the "average to good" point (3.5) on the scale. For the attitudinal survey and mathematics instruments, the ratings were all in the "good to excellent" interval (4 to 5).

The average time taken for the administration of each of the instruments showed that the reading test took nearly one hour, the mathematics tests about 40 minutes, and the attitudinal survey about 25 minutes.

In addition to the rated responses, teachers were also invited to comment on any aspect of the administration or character of the instruments. These comments are summarized.

## CHAPTER VI. CONCLUSIONS AND RECOMMENDATIONS

The conclusions which follow from the reading, mathematics, and attitude results presented in the previous chapter attempt to highlight only a few of the many conclusions which could be drawn. Each reader who wishes to examine the results in detail can probably find several more contrasts and points for discussion. The reader should be cautioned not to over generalize from the results and thereby arrive at conclusions which might be premature. Since there were no subgrouping of students, no comparisons between groups are possible. The only observations possible are within the areas tested and in some cases between third and sixth graders.

## READING

The reading results include the percentages of students responding correctly to each item. Then mean percentages were computed by averaging over all the items in a particular sub-test. The present interpretation is based on these data. It must be regarded as preliminary. A more expanded interpretation must await further analysis of the data.

Recognizing these reservations, the data present a reasonable picture of reading instruction in Minnesota. While the picture does not illustrate educational perfection, it is by no means gloomy. The following generalizations seem warranted:

(1) By the end of third grade, children are nearing mastery of most of the word attack skills tested in the assessment. End of the year sixth graders have improved over end of the year third graders on every skill, with the greatest improvement coming in the most difficult word attack skills.

(2) There is considerable growth between grades three and six on comprehension skills, perhaps reflecting a shift of emphasis from word attack to comprehension in intermediate grade instructional programs.

(3) In terms of the study skills tested, neither third nor sixth graders demonstrated the degree of mastery achieved for word attack skills, perhaps reflecting the amount of emphasis given to these skills in the elementary curriculum. There is definitely a developmental trend; that is, sixth graders out-performed third graders on all common tests.

Regardless of the particular intermediate grade program, teachers expose children to increasingly complex written discourse and they require children to demonstrate that they have understood what they read. These dual emphases result in maximal growth for those tasks requiring attention to longer units of discourse. As the units of discourse decrease in length, the growth from grade three to grade six decreases.

The study skills sub-tests were developed to assess two basic types of study skills: (1) skills that directly follow from mastery of basic word attack skills and (2) skills that reflect a basic competency in using or finding textual or reference material.

It is clear that where common tests were given at both grades, progress in mastery of Type 1 Study Skills occurs between the end of grade three and six. Also, the order of the difficulty of the commonly tested skills remains the same but by grade six there is considerable improvement in the most difficult sub-test, Guide Words.

## MATHEMATICS

The conclusions from the mathematics testing are based largely on the results summarized in the table below. Since only about one-half of the objectives written for mathematics were tested, these conclusions should not be viewed as a complete measure of the competence of the third and sixth graders tested.

DISTRIBUTION OF ITEMS BY PERCENT OF STUDENTS ANSWERING ITEM CORRECTLY

Grade 3

| Content Area | Total Number of Items | Number of Items by Percent Correct 100-90 | 90-80 | 80-70 | 70-60 | 60-50 | Less Than 50 |
|---|---|---|---|---|---|---|---|
| Numeration | 15 | 2 | 5 | 4 | 3 | 1 | 0 |
| Addition and Subtraction | 25 | 7 | 10 | 6 | 1 | 1 | 0 |
| Multiplication and Division | 5 | 0 | 0 | 5 | 0 | 0 | 0 |
| Geometry | 6 | 1 | 2 | 1 | 0 | 1 | 1 |
| TOTALS | 51 | 10 | 17 | 16 | 4 | 3 | 1 |

Grade 6

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Numeration (With Fractions) | 20 | 2 | 3 | 8 | 3 | 2 | 2 |
| Addition and Subtraction | 9 | 3 | 1 | 2 | 2 | 0 | 1 |
| Multiplication and Division | 10 | 0 | 1 | 3 | 3 | 2 | 1 |
| Geometry | 5 | 2 | 0 | 1 | 0 | 0 | 2 |
| Fractions (Operations) | 10 | 1 | 1 | 3 | 2 | 2 | 1 |
| TOTALS | 54 | 8 | 6 | 17 | 10 | 6 | 7 |

THIRD GRADE

Numeration:

The results in the area of numeration showed a wide spread of competency. The more difficult items required a familiarity with fractional symbols and finding a missing number in a pattern of three-digit even and odd numbers.

The items which the students found easiest were related to the co...ting of objects, patterns of one and two digit numbers, and place-value identification.

Addition and Subtraction:

The performance of third graders on items in the area of addition and subtraction of whole numbers was highest among all of the four content areas tested.

Multiplication and Division:

The five items relating to the multiplication and division of whole numbers were answered correctly by between seventy and eighty percent of the students tested. By the end of the third grade, students have spent much more time with addition and subtraction concepts than with multiplication and division.

Geometry:

The pattern of results in the geometry area were similar to the area of numeration, where again the spread of competency was apparent.

## Sixth Grade

The results of the testing of sixth graders revealed a greater spread in performance than the results from the third grade. As children progress through the grades there is an ever widening range of mathematical skills and concepts to be acquired. Therefore, within the category of "numeration" the students see a variety of items for which they have had varying degrees of exposure and practice.

Numeration:

Twelve of the 20 items in the numeration area were answered correctly by seventy percent or more of the students tested. However, four items were answered correctly by sixty percent or less of the students. Three of these four items required operations with fractions and the ordering of fractions.

Addition and Subtraction:

The computational skill of sixth graders was evident in addition and subtraction items where four of nine items were answered correctly by more than 80 percent of the students tested. The student performance declined somewhat in items calling for the recognition of the concept of regrouping (associativity) and to identify addition and subtraction on the number line.

Multiplication and Division:

Only one of the ten items in the multiplication and division area was answered correctly by more than 80 percent of the sixth graders. This item required the multiplication of a four digit number by a single digit. Items causing the greatest difficulty required the recognition of the correct regrouping of three factors (associativity). Only about fifty percent of the students answered these items correctly.

Geometry:

An item calling for the recognition of common geometric figures and another item requiring the identification of a figure of largest area were answered correctly by over 90 percent of the students. In contrast, an item requiring the identification of elements related to a circle was answered correctly by less than fifty percent of the students.

Fractions:

The ten items requiring computation with fractions produced a wide range of results. Five of the ten responses fell between sixty and eighty percent correct. The two items above eighty percent required the addition and subtraction of decimal fractions, where the placement of the decimal point was not required. Three items answered correctly by sixty percent or less of the sixth graders required the addition and subtraction of common and mixed fractions.

## ATTITUDINAL

The content of each of the attitudinal areas is described in Chapter V, Section D of the complete report. The conclusions following each of the eight headings below are by no means the only observations which could be made from the results in the previous chapter. These conclusions are stated in an attempt to lead and encourage the readers to explore the full range of the results and seek out information which is potentially useful.

Attitudes Toward School and School Achievement:

About three-fourths of the third and sixth graders surveyed expressed a liking for school. However, about three-fourths of the sixth graders thought school was "boring" at least some of the time.

Marks (grades) were ranked as "important" to "very important" by almost ninety percent of the students tested. Competition for marks or "doing better" than others in the class was held as "important" to "very important" for only about forty percent of the students.

School Atmosphere:

About twenty percent of the third graders viewed the principal's main job as one of punishing students, while less than ten percent of the sixth graders held this viewpoint. However, when asked about "liking the principal to visit their classroom" over fifty percent of the third graders agreed, while only fifteen percent of the 6th graders agreed.

The view of the teacher as a "listener" at least some of the time was held by nearly ninety percent of the students, while over one-third of the students felt the teacher "talked too much". Over seventy-five percent of the student felt they had to be "too quiet in class".

Almost fifty percent of the students "didn't know" if other people in school cared about them.

Self-Concept:

Both third and sixth graders are generally positive in viewing themselves, but about one-half of the population surveyed "did not know" if they were easily liked or made more mistakes than others.

When asked about their ability to "learn", about one-third of the students expressed some difficulty. Approximately eight-eight percent expressed a willingness to take some risks with re[illegible] "trying new things".

Attitudes Toward Reading:

Over eighty percent of the students surveyed expressed a willingness to read at least "sometimes" and over fifty percent "most or all of the time".

When asked to choose whatever they wanted to do in school, the preference for reading was stated by about sixty percent of the students at

least "sometimes". About the same proportion of students ranked reading "as at least as important as any other subject". About fifteen percent of those surveyed ranked reading as "more important than any other subject".

When asked if they had a hard time remembering what they had read, one-half of the students expressed having this problem at least "sometimes".

Attitudes Toward Mathematics:

More than one-half of the students "liked" or thought of arithmetic as "fun". Also, about one-fourth of the students viewed arithmetic as their "worst" subject.

About ninety percent of the sixth graders and about seventy percent of the third graders ranked arithmetic as "at least as important" as any other subject.

Attitudes Toward Citizenship:

Eighty percent or more of the students surveyed agreed that "rules" were necessary and to be obeyed by them. However, fewer students, about seventy percent, agreed that grown-ups need "rules".

Voting rights, and the right to go to school for other races and religions was agreed to by about ninety percent of the students, while about one-half of the students were undecided about being "represented" in the government by a person of another race or religion.

When asked about the exercising of constitutional rights such as the right to "plan demonstrations and marches to change things they don't like about the government" the opinions were evenly divided between "agreeing" and

"disagreeing". About one-fourth of the students surveyed said "I don't know".

Career Awareness:

The importance of being involved in the "world of work" is a very commonly held value or attitude of both third and sixth grade students. Over eighty percent of the students surveyed agreed with statements which linked "hard work" with "feeling good", "being responsible", "getting what one wants from life" and "success".

Environmental Attitudes:

More than two-thirds of the students agreed that time should be spent learning about environmental problems. When surveyed about taking positive steps to improve the environment such as "picking up trash" fewer students were willing to participate. The change from third to sixth grade was noticeable with the sixth graders showing the greater concern.

Recommendations

Before listing a set of recommendations which have emerged as a result of the pilot phase of the assessment activities, the following observations can be made based on this report:

1) Citizens, school professionals, legislators, university and college personnel, and State Department of Education staff gave their support when asked to become involved in the assessment program.

2) Minnesota school administrators, teachers, and students cooperated fully when asked to be part of the pilot phase testing.

The following specific recommendations result from a review of the pilot phase activities:

1) Guidelines need to be developed for specific subgroups of students relating to school, community, and family characteristics.

2) The matrix sampling approach which provides information on groups of students as opposed to individuals appears to be a viable solution to an efficient and economical method of collection of assessment data.

3) Full implementation of the assessment program will necessitate the development of student assessment measures in areas which have been found to be difficult to measure. Therefore, the Department needs to allocate additional funds to develop these measures.

4) A review of the teacher reactions to the assessment shows that even though complete instructions were given, there appears to be enough variation in the testing time allotments so as to question the standardization of administration. Therefore, it is recommended that the Department explore the possibility of using a pre-recorded tape to pace students through the assessment exercises in a uniform procedure.

5) A fuller implementation of the assessment program will require a substantial amount of local district personnel time. The Department therefore should explore the feasibility of utilizing trained assessment administrators paid by the Department to conduct the necessary field work and thereby relieving the local district of this burden.

6) An assessment program requires a fully integrated systematic approach involving a wide range of expertise in the planning, implementation, and dissemination of an ongoing assessment program.

7) As additional content areas are developed for assessment purposes it is likely that many of the materials and technology developed by the National Assessment of Educational Progress (NAEP) will be useful to the Department. This procedure would allow for the most cost effective utilization of assessment resources in Minnesota.